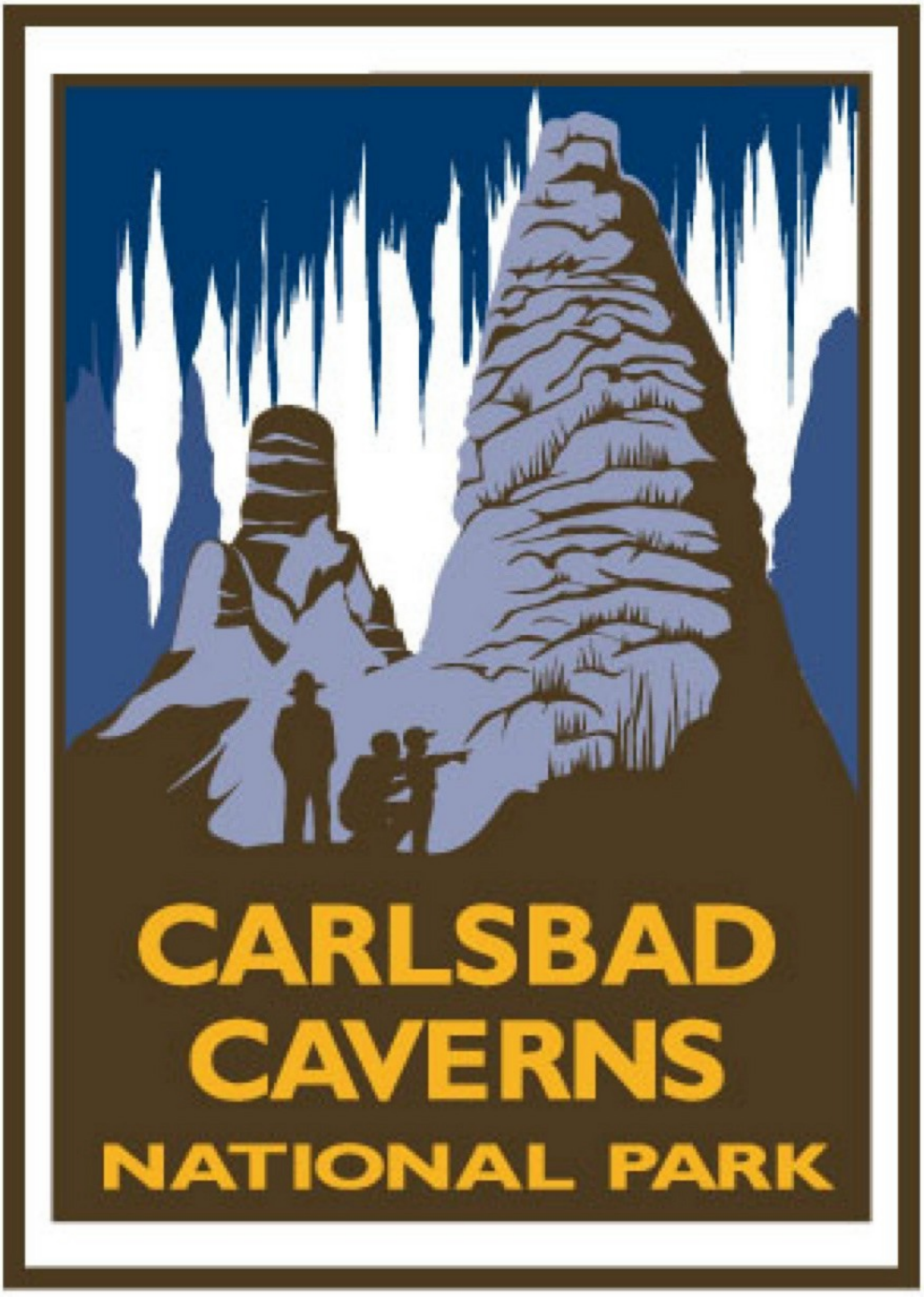
About Bats, Caves, & Deserts

A curriculum and activity guide for Carlsbad Caverns National Park

Elementary School



Section 7 – Plant Activities

- **They Ate What?**
- **Where Did the Water Go?**
- **An Automatic Water System**
- **Giving Trees**

They Ate What?

Pre-Visit and Field-Trip Activities

Intermediate and Secondary Levels

Science (Life)**, Social Studies** (Cultures, Geography)

45 Minutes plus Field Trip

Objective(s). Students will list and identify plants used for food or medicinal purposes.

Related NM Content Standards with Benchmarks. SC10-M1, SC10-M2, SC10-H2, SS6-M2, SS11-M3

Method. Students will prepare identification records/cards for plants common to Carlsbad Caverns area. Students will hike the nature trail at the park, identifying plants used by early American Indians.

Materials. field plant guide and/or southwest desert plant field guide, large index cards, pens, coloring pencils

Key Vocabulary. flora, roots, medicinal, names of plants underscored below

Background. The early American Indian diet consisted mainly of wild plants. Although many early American Indians were hunters, they were also gathers. Eighty percent of what they ate was vegetation rather than meat. The *yucca* was quiet popular among the early American Indians. Its flower, stalk, buds, core and fruit were eaten. *Prickly pear* pads were roasted, then placed on wounds to heal cuts and infections. The pads of the cacti and fruit were eaten. Soaked *algerita* wood chips were used to relief sore eyes, and the plant's berries were eaten. The *Texas walnut* (Ephedra) was eaten raw or was grounded into flour. Mashed leaves and juice of *mesquite* were used to sooth irritated eyelids. A drink was made from its pods and seeds, and its fruits were eaten. *Juniper* berries were made into tea. Tea was also made from the *littleleaf sumac*. For more information about these and other useful plants, refer to a field guide.

Suggested Pre-Visit Procedure. Prior to the field trip, the teacher will instruct students to…

1. Research how early American Indians who inhabited the Chihuahuan Desert used plants, roots and flora.
2. Make identification records on large index cards for at least 10 plants found at Carlsbad Caverns National Park. Each record should include common name, scientific name, family, where found, description, food/medicinal/clothing purposes and an illustration in color.

Suggested Field-Trip Procedure. During the field trip, the teacher will instruct students to…

1. Walk the nature trail, looking for and identifying plants used by the early American Indians. (Students will need to take their identifications records to the park.)
2. Mark each plant found on their illustration records.

Cautions

- Some plants may be fatal if swallowed.
- The spines (needles/thorns) of many desert plants inflict pain.
- Collecting anything, without a special-use permit, is illegal in a national park.

Where Did the Water Go?

Pre-Visit or Post-Visit Activity

Primary/Elementary Level

Science (Unifying Concept, Physical, Life)

Two 30-Minute Sessions plus Monitoring Over the Period of a Day

Objective(s). Students will demonstrate and explain what evaporation is and how life in the desert adapts to it.

Related NM Content Standards with Benchmarks. SC2-E3, SC9-E1, SC10-E1, SC11-E1

Method. By demonstrating evaporation in action, students determine how animals and plants of the desert adapt to extremely high temperatures.

Materials. sponges, cut up pieces of sponge, 2 shallow pans, chalkboard, bucket of water, blackboard

Key Vocabulary. evaporation, transpiration, nocturnal

Background. Water is evaporating from surfaces all the time. This evaporation helps desert animals and plant survive hot, dry lands. Some animals sweat. As the sweat changes from a liquid to a vapor, it pulls heat away from the surface, thus cooling the animal. Some animals, like the roadrunner, pant to cool down. Other animals have big ears and long legs, such as jackrabbits. Their big ears give off body heat and their long legs keep their important body organs away from the hot desert ground. All desert animals have their own way of removing heat to cool their bodies.

Carlsbad Caverns National Park has 76 species of mammals, 44 species of reptiles and amphibians, and more than 800 species of plants. When you visit the park, there is a good chance that you may not see its abundant wildlife. That is because many of these animals are nocturnal, searching for food during the cooler night hours. Many of the park's plants have waxy coverings, small leaves that roll up in the hot day, small pores, hairs and spines. Without a protective waxy coating, small leaves that roll up and small pores, these desert plants would lose most of their water through the process of transpiration. Hairs and spines also reduce water loss by breaking the wind.

Suggested Procedure

1. Have students demonstrate how water evaporates by wiping damp sponges across a blackboard. When the dry patches appear, ask students, "Where did the water go?" Explain that the water evaporated—changed from a liquid to an invisible gas.

2. Have students demonstrate the affects of heat on evaporation. Take 2 shallow pans filled with equal amounts of water. Place one directly in the sunlight and the other in a shady place. Using a measuring cup, determine the amount of water left in each pan at the end of the day. Have students explain the results.

Alternative

A. Have students write their names on the sidewalk with a wet piece of sponge.

B. Instruct students to write their names twice—in a sunny location and in a shaded location.

C. Time how long it takes for the names to disappear.

D. Have students explain why the water evaporates more quickly in the sun.

3. To show how animals stay cool by sweating, have each student dip one arm into a bucket of water, leaving the other arm dry. Next have them wave both arms in the air. Which feels cooler? Why?

4. To demonstrate how plants retain moisture, make two wet spots on the sidewalk. Cover one with a clear plastic. Which one dries quicker? What part of the plant does the plastic represent?

An Automatic Watering System

Pre-Visit or Post-Visit Activity

Primary/Elementary and Intermediate Levels

Science (Life)

45 Minutes plus Monitoring for up to a Week

Objective(s). Students will describe ways cacti are adapted to the desert.

Students will demonstrate how temperature effects transpiration.

Related NM Content Standards with Benchmarks. SC10-E1, SC11-E1, SC11-M1, SC11-M2

Method. Students compare desert plants to woodland plants.

Materials. Each Group: a potted cactus, a potted woodland plant, flashlights, plastic bags, pieces of string (to close plastic bags), 2 sponges of equal size, petroleum jelly, 2 plastic margarine tubs, rubberband or string, transparent plastic bags, thermometer, paper, pencil

Key Vocabulary. transpiration, photosynthesis

Background. Carlsbad Caverns National Park is located in the northern part of the Chihuahuan Desert. Plants that grow in deserts look different than those that grow where there is much rainfall. Many of the plants at the park are cacti. Cacti are uniquely adapted to the desert. The spines on a cactus help shade the plant from the sun's rays and break the strong desert winds. The more barrel-shaped the cactus is, the less light shines on the plant, especially in the hottest part of the day when the sun is overhead. Water loss through the leaves of a plant is called transpiration. Cacti and other desert plants have a coating of a waxy substance that helps protect them from water loss. Cacti and other desert plants open their pores to receive carbon dioxide (which is necessary for photosynthesis) at night instead of during the day when temperatures are much higher.

See the background for "Where Did the Water Go?" activity.

Suggested Procedure for Part 1

1. To each group, hand out one cactus, one woodland plant and one flashlight.
2. Turn out the lights. Have students shine flashlights (from above) only on the woodland plant, then only on the cactus. Make sure the flashlight is held high enough to create shadows. What is the difference? The leaves on the woodland plant *catch* more light; the spines of the cactus shade the plant from direct sunlight.

Suggested Procedure for Part 2

1. Have each group completely cover a healthy potted cactus with a transparent plastic bag, using a rubber band or plastic bag to secure the bag around the top.
2. Have each group repeat #1 using a potted woodland plant, such as a fern.

3. Have each group place their pots in a sunny location and lean a thermometer against each pot, positioning thermometer so it will not receive direct sunlight.

4. Have students observe the plants and bags for a week. Daily, have groups record the temperature and any changes in appearance for both of their plants.

Suggested Procedure for Part 3

1. Give each group 2 small tubs, 2 equal-sized sponges and petroleum jelly.

2. Pour 1/4 cup of water into each tub.

3. Cover one side and all four edges of one sponge with petroleum jelly. Lay the sponge non-greased side down into the tub of water. Lay the other piece of sponge in the other tub of water.

4. Watch the sponges soak up the water. Over the next week, find out how long it takes for each sponge to dry out. The one with petroleum jelly will dry out last. Explain that the jelly, like the wax that covers many desert plants, prevents water loss through transpiration.

Giving Trees

Pre-Visit, Field-Trip and Post-Visit Activities

Primary/Elementary Level

Science (Life**),**

Language Arts (Unifying Concepts, Receptive Language, Expressive Language)

Two 50-Minute Sessions

Objective(s). Students will explain the benefits of trees in the natural environment.

Students will develop a biography of a chosen tree in a natural environment.

Related NM Content Standard with Benchmarks. SC10-E1, SC10-E2, SC11-E1, LA3-E1, LA4-E1, LA5-E1, LA5-E5

Method. During their field trip, each student *claims* a tree. As a post-visit activity, students research their trees and write tree biographies.

Materials. *The Giving Tree* by Shel Silverstein, copies of the student worksheet, crayons or colored pencils

Key Vocabulary. tree, bark, leaf, biography

Background. Living trees create shades and serve as homes for insects and small animals. Trees clean the air by removing carbon dioxide and releasing oxygen. They also return nutrients to the soil through their fallen leaves. Dead trees are hosts to fungi (which also decompose them), small animals and insects. Dead trees replenish the soil with nutrients for new growth. Healthy trees are essential for our environment.

Suggested Pre-Visit Procedure

1. The day before the field trip, read *The Giving Tree* to your students under a large shade tree.
2. Discuss how the tree in the story gave of itself. Ask students how trees are essential to a healthy natural environment.
3. Instruct students to *claim* a tree at the park during the course of their field trip.

Suggested Post-Visit Procedure

1. After returning from the field trip, distribute copies of the student worksheet. Review each section of the worksheet with your students.
2. Have students use their worksheets to write biographies about the trees they selected on their field trip. Give students time to research their trees with reference materials available in the school library. Encourage students to be accurate and creative.

3. Have students share their biographies with each other. Place special emphasis on the contributions each individual tree has made to its environment. Ask students why they choose the trees they did.

Biography of a Tree

Student Worksheet

Identification (name of your tree)

Birth Place (Walnut Canyon, Rattlesnake Springs or wherever)

Age (young, middle-aged, old, deceased)

Characteristics (List characteristics and draw pictures of the bark, leaf and seed of your tree.)

Bark	Leaf	Seed

Special Adaptations

Contributions to its Environment

Why I Chose this Tree

Illustration (Draw a picture of your tree on back.)